# WILEY, REIN & FIELDING

1776 K STREET, N.W.
WASHINGTON, D.C. 20006
(202) 429-7000

DAVID E. HILLIARD
(202) 429-7058

FACSIMILE
(202) 429-7049
TELEX 248349 WYRN UR

May 5, 1994

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20006
STOP CODE: 1170

Re: Ex Parte Communication in PR Docket No. 93-61

Dear Mr. Caton:

Pursuant to Section 1.1206(a)(2) of the Commission's Rules, notice is hereby given of an *ex parte* communication regarding the above-referenced proceeding. An original and one copy of this letter and its attachments are being filed with the Secretary's Office.

Yesterday afternoon, Charles L. Taylor, President, Pinpoint Communications, Inc. ("Pinpoint"), and Richard E. Wiley and David E. Hilliard of Wiley, Rein & Fielding, Pinpoint's counsel, met with Chairman Reed E. Hundt and his Senior Legal Advisor Ruth Milkman.

Messrs. Taylor, Wiley, and Hilliard reiterated and expanded on Pinpoint's positions regarding spectrum allocation and licensing issues expressed in its Comments and Reply Comments filed in this proceeding.

Attached hereto is a copy of the documents made available during the meeting.

If there are any questions regarding this matter, please contact the undersigned.

Respectfully submitted,

David E. Hilliard

David E. Hilliard
Attorney for Pinpoint Communications, Inc.

Attachments
cc: Chairman Reed E. Hundt
Ruth Milkman, Esq.

# FCC Regulations: 902-928 MHz Band

## (Hierarchy of Shared-Band)

- **Industrial, Scientific, and Medical (ISM)**
  - Used for industrial purposes such as heating not communications
- **U.S. Government**
  - Fire control radar on ships typically five miles off-shore
- **Automatic Vehicle Monitoring Section 90.239 of Rules**
  - The site licensed users in the band.
- **Amateur Radio Operators**
  - Licensed users - generally not site specific
- **Part 15**
  - Spread-spectrum systems can use up to one watt
  - Narrow-band signals can use up to 90 milliwatts

Lower hierarchy users cannot interfere with higher hierarchy users.


COMMUNICATIONS, INC.

PR Docket No. 93-61
Ex Parte Presentation

May 4, 1994

## Wide-Area AVM Serves Important Public Interest Objectives

- Intelligent Vehicle-Highway Systems (IVHS)
  - Metropolitan-area traffic monitoring and control
  - Mass transit systems management
  - Public and private safety systems
  - Emergency roadside assistance
  - In-vehicle information
- Commercial fleet management
- Stolen vehicle recovery
- Advantages over other vehicle location systems, such as GPS
  - Far superior urban coverage -- where demand is greatest -- because not blocked by buildings and trees
  - Absence of demands on spectrum to transmit location information from mobile to base station
  - GPS is a solution to a limited part of the IVHS puzzle

## The Wide-Area AVM Marketplace Should be Governed by Competition

- Record reveals a diversity of approaches
- Final rules should accommodate this diversity to the extent practicable
- Competition should decide which systems best serve the public interest

## Pinpoint's ARRAY™ System

- Spectrally efficient AVM system designed to operate in the high-noise environment of the 902-928 MHz band
  - 12-16 MHz spectrum requirements can be met on a **shared** basis
  - Can co-exist with other users (ISM, government, local-area AVM, amateurs, Part 15)
  - Other wide-area AVM systems hope to use lower power levels and employ longer ranges that are simply not suitable for reliable, relatively interference-tolerant operation in the band
- High-capacity, accurate vehicle location needed for IVHS
  - 1,000-3,000 vehicles per second per market (raw 30-foot accuracy, 95% of time)
  - 10-250 times as much location capacity as other wide-area systems
  - Many IVHS initiatives require Pinpoint's capacity
    - Teletrac's capacity would almost be consumed by a police department in a medium-sized metro area
    - SW Bell's system nearly would be exhausted by a moderately sized taxi company
- High-speed data-messaging on same signal as vehicle location function (approx. 300 kbps)
- Proven in Washington experimental system



Pinpoint COMMUNICATIONS, INC.

## Wider Bandwidth Is Critical to High-Speed, Accurate Vehicle Location

- The rates achieved by Pinpoint's ARRAY™ system are critically dependent on available bandwidth
  - Severe multipath distortion's characteristic of the mobile communications environment can be effectively ameliorated by the signal resolution at bandwidths of 12 MHz and above
  - The vehicle location rate increases significantly faster than the occupied bandwidth for bandwidths less than 30 MHz
  - Wider bandwidths give designers more flexibility
- The greater capacity of wider bandwidth systems allows the FCC to maximize the usa of this band while establishing a competitive marketplace
- Much like the "Steinbrecher Box", Pinpoint's system uses wider bandwidth to increase the spectrum efficiency over that which can be achieved through simple, narrower bandwidth frequency division

## The Entire 902-928 MHz Band Should Be Made Available to Wide-Area Systems

- Intentions of wide-area systems to meet demand for AVM require access to entire 26 MHz of 902-928 MHz band
- Wide-area systems are compatible with local-area systems
  - Wide-area AVM operators have indicated that wide-are systems can operate sufficiently well in the presence of local-area systems
  - Local-area systems have not indicated that wide-are systems are a potential interference problem
- Wide-area systems are compatible with Part 15 devices
  - Part 15 devices should continue to be allowed to operate throughout 902-928 MHz band consistent with obligations of noninterference
  - Wide-area AVM industry supports adoption of an objective standard of "harmful interference" in the 902-928 MHz band from Part 15 devices
    - Objective standard would remove uncertainty in cases of interference
    - Both wide-area system and Part 15 device developers would have benchmark for measuring compatibility

## A Band Plan Is Available That Would Accommodate the Diversity of Wide-Area AVM Proponents

- Pinpoint modification of basic Teletrac proposal
- 912-928 MHz sub-band available to wide-area AVM systems on time-sharing basis and co-primary with local-area AVM systems
- 902-912 MHz sub-band available to wide-area AVM systems an a primary basis, generally superior to local-area systems

## 912-928 MHz Sub-Band

- Wide-area and local-area systems share on a co-primary basis
- All financially and technically qualified wide-area AVM applicants filing within a filing window would negotiate a time-sharing arrangement from common, equivalent bargaining positions
  - Negotiated arrangements may include elements of frequency division, CDMA, statistical spatial diversity, wideband forward links, and other characteristics of particular qualifying designs
  - In the absence of a successful negotiation, simple default round-robin arrangement would take effect
  - Plan has the potential for future entrants through reopening of the window
- Sub-band would give local-area AVM systems opportunities for a least two, and as many as three, 6 MHz channels, as desired by several local-area system proponents
- Wide-area systems would have to tolerate Part 15 devices up to a certain interference ceiling

## 902-912 MHz Sub-Band

- Commission could license this sub-band in one of several ways:
  - frequency division
    - *e.g.*, 902-906 MHz, 906-910 MHz, 910-912 MHz channelization
    - would seem to accommodate, for example, MobileVision, Teletrac, and Southwestern Bell
    - narrowband forward links could be located within the system's channel or at 927.5 - 928 MHz
  - statistical spatial diversity (Teletrac ex parte proposal)
  - time-sharing
- Any grant of exclusivity in the face of mutually exclusive may require spectrum auctions under recent Communications Act amendments
- Existing local-area systems should be grandfathered and required to move only in instances of actual interference that are not otherwise reconciled
- Local-area AVM systems should be permitted to attenuate side-band energy below 912 MHz on a primary basis subject to strict power limits

## Incidental Operations Could Be Accommodated in Other Spectrum Allocations

- Voice operations
  - Emergency basis only in 902-928 MHz band
  - Otherwise, in cellular, SMRS, PCS, or other private radio or common carrier band
- Data operations
  - On same signal as vehicle location pulses (Pinpoint)
  - In same channel as vehicle location pulses (Southwestern Bell) subject to any sharing mechanism in place
  - In narrowband forward link

## The Commission Should Not Drop the Proposed Allocation of 902-928 MHz to AVM in Favor of Enhancing the Position of Part 15 Devices

- Part 15 industry asks the Commission to overturn long-standing and sound spectrum allocation policies
- Consideration of other spectrum for wide-area AVM would delay implementation of wide-area AVM by several years right at the time several operators are ready to implement their networks
- Commission has recently made available over 40 MHz of unlicensed PCS spectrum that could be used for Part 15 devices in addition to the hundreds of MHz that could be used to support the functions such devices serve, on both a licensed and unlicensed basis
  - Part 15 devices are also allowed to operate with high power at 2400-2483.5 MHz and 5725-5850 MHz. This is 8 times the spectrum available at 902-928 MHz.
- Commission has recognized in the past that users of Part 15 devices should turn to licensed services when Part 15 operation is inadequate
- No other viable spectrum is available for wide-area AVM
  - Spectrum recently released by NTIA around 2.4 GHz inappropriate
    - Absorption of the signal is far greater
    - Significantly greater multipath problems even with line-of-sight
  - Problems at 4 GHz even worse

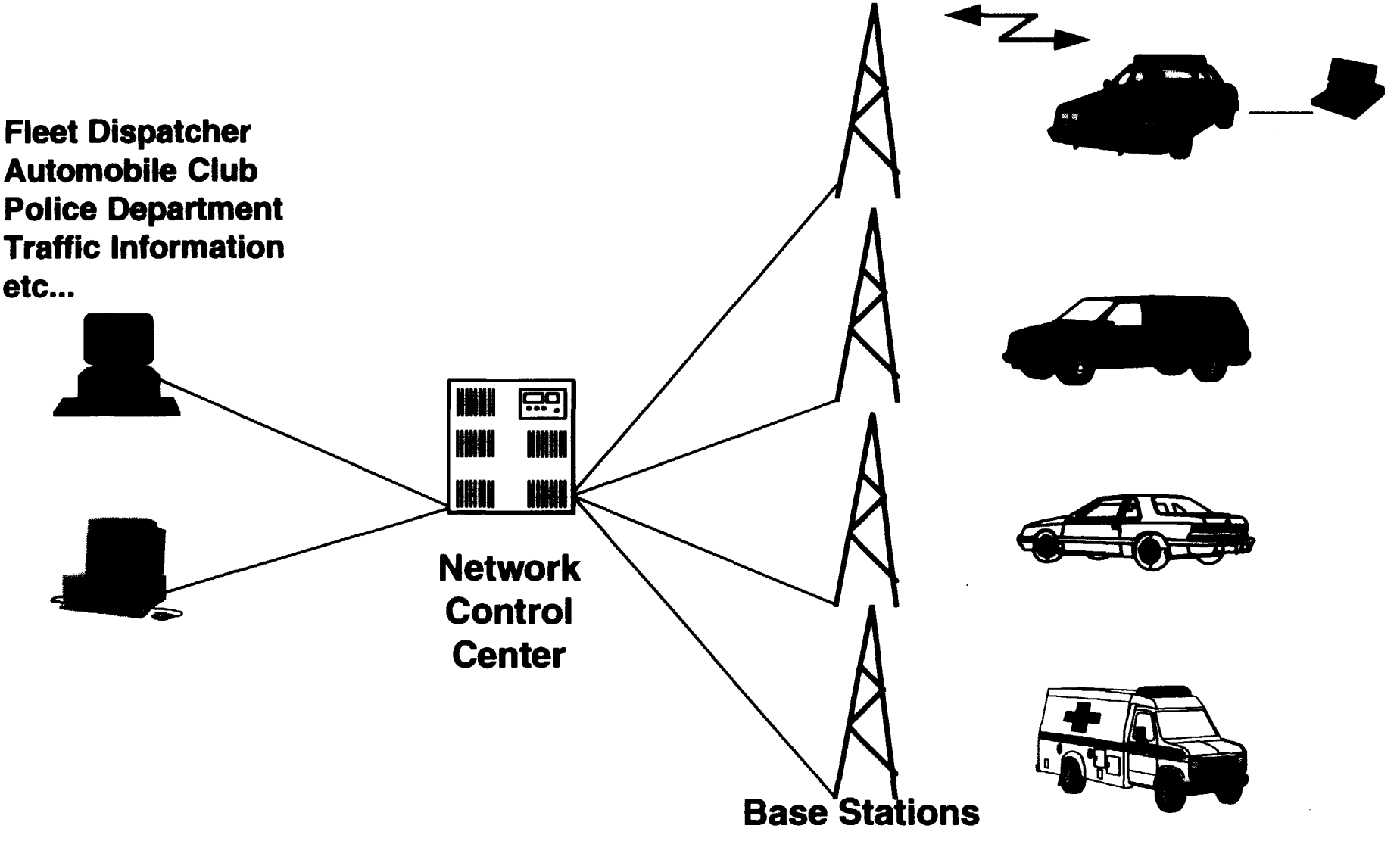
## The Commission Should Allocate the 902-928 MHz Band to Wide-Area AVM Expeditiously

- As the Commission recognizes, wide-area AVM will bring a host of important services to the American public and will be central to the introduction of IVHS
- The industry has been under a cloud of uncertainty for almost two years
- Any substantial further delay may weaken the present opportunities to establish a development of a highly competitive environment for the provision of AVM services, in our nation's urban centers in particular

# The Technology of the Future for Automatic Vehicle Monitoring (AVM)

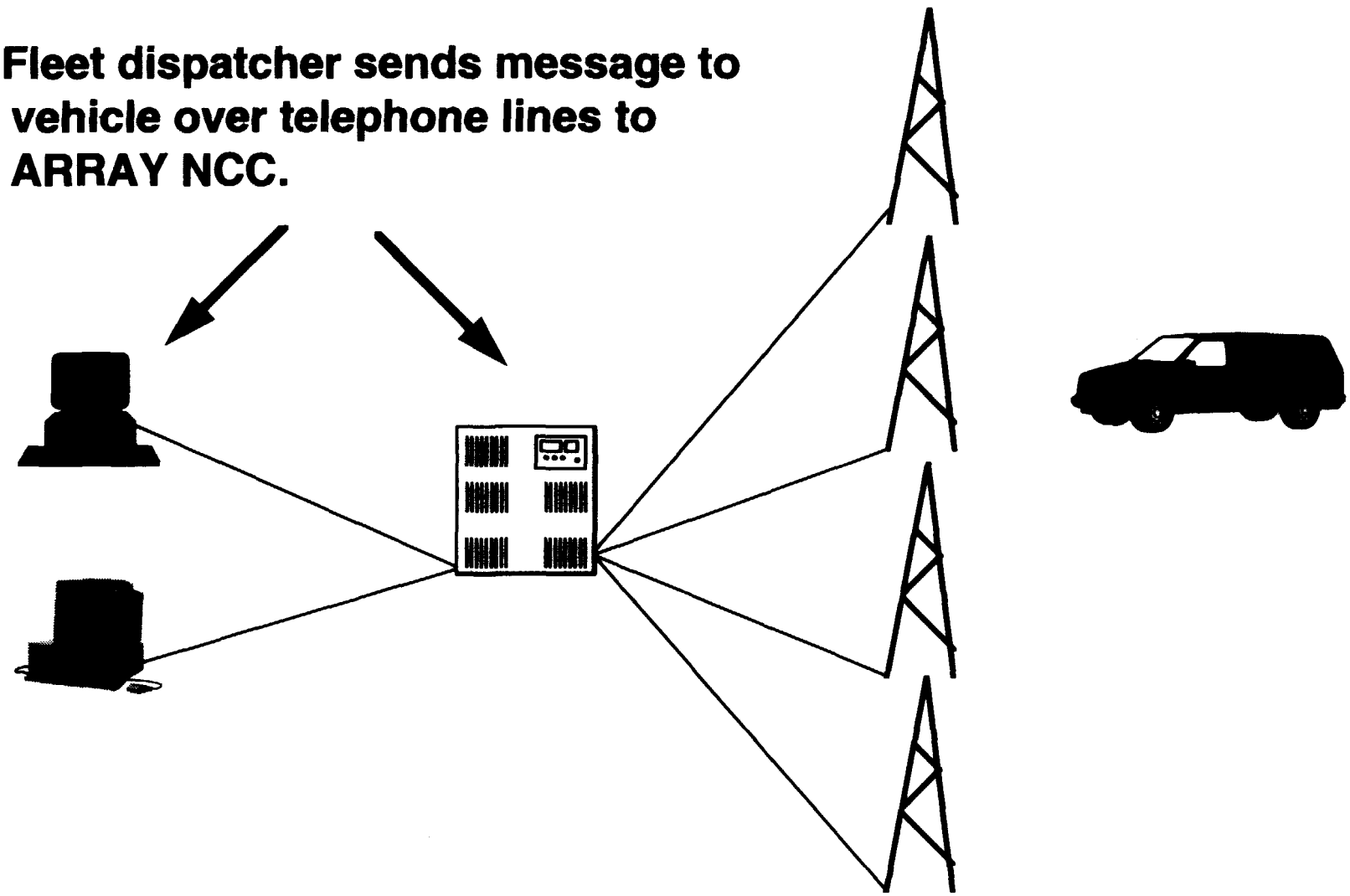
Pinpoint Communications, Inc
Ex Parte Presentation
PR Docket No. 93-61

# The ARRAY Network



# Round Trip Message Time Averages 2 Seconds (includes .00064 seconds of Network Airtime)

1) Fleet dispatcher sends message to vehicle over telephone lines to ARRAY NCC.



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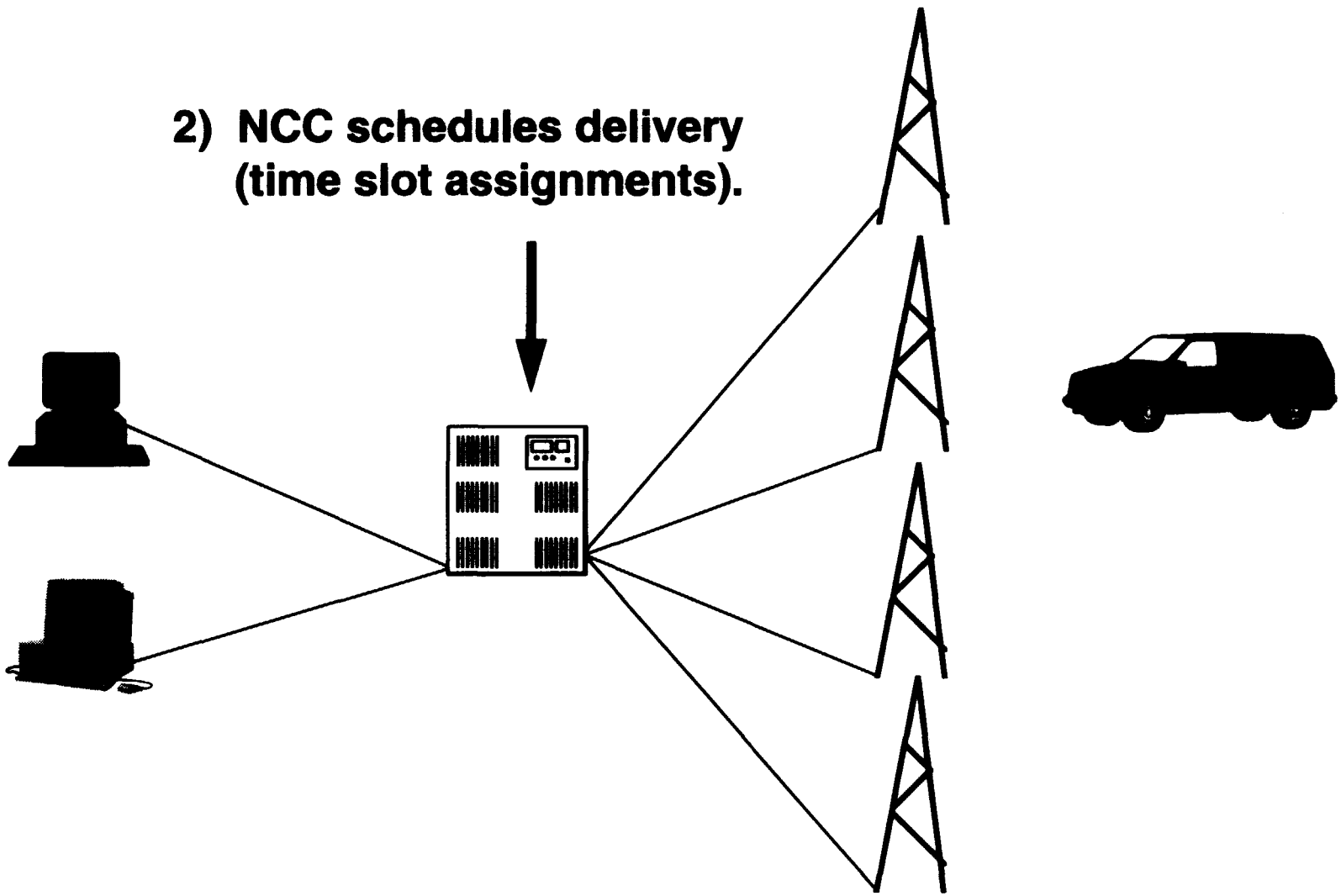

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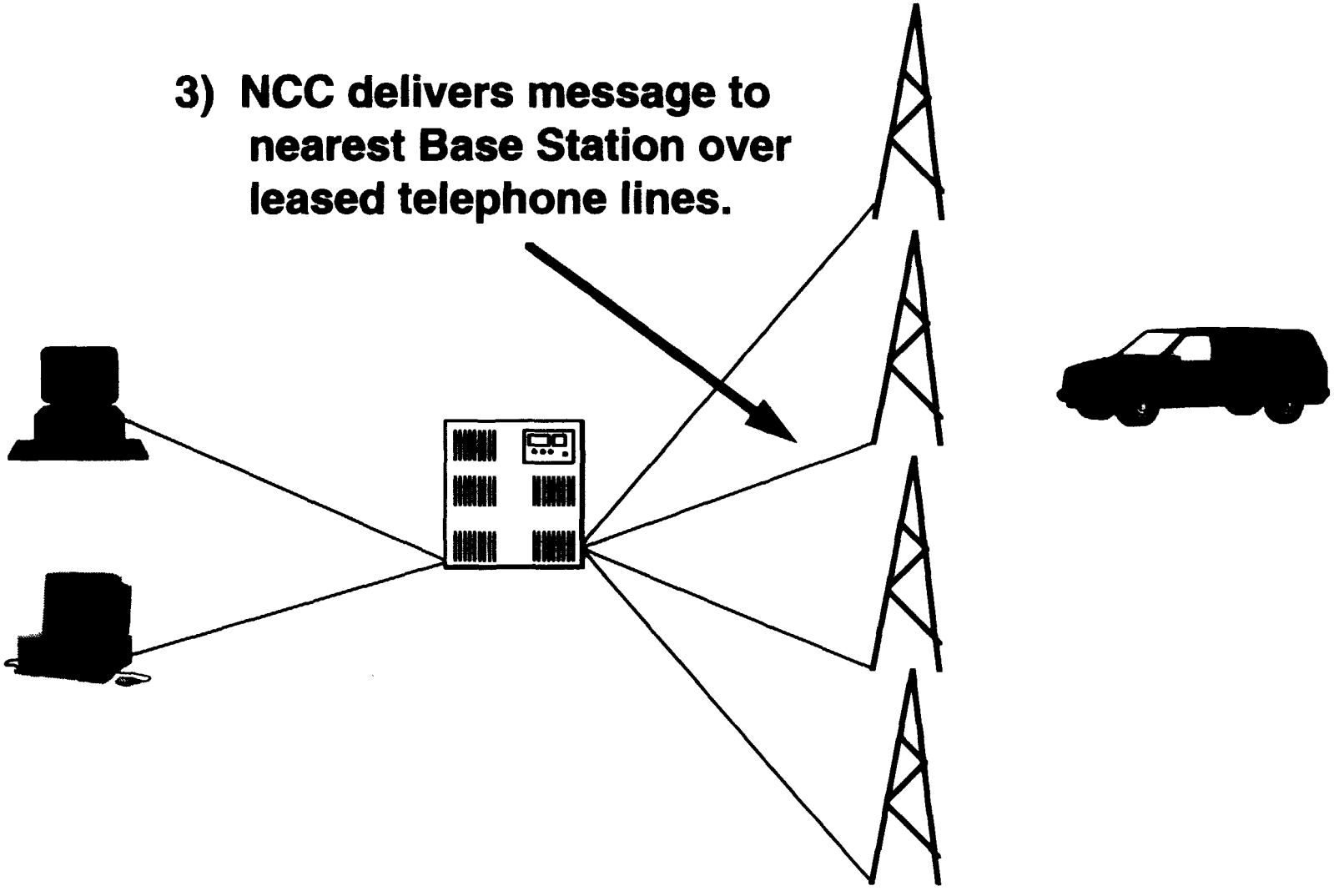
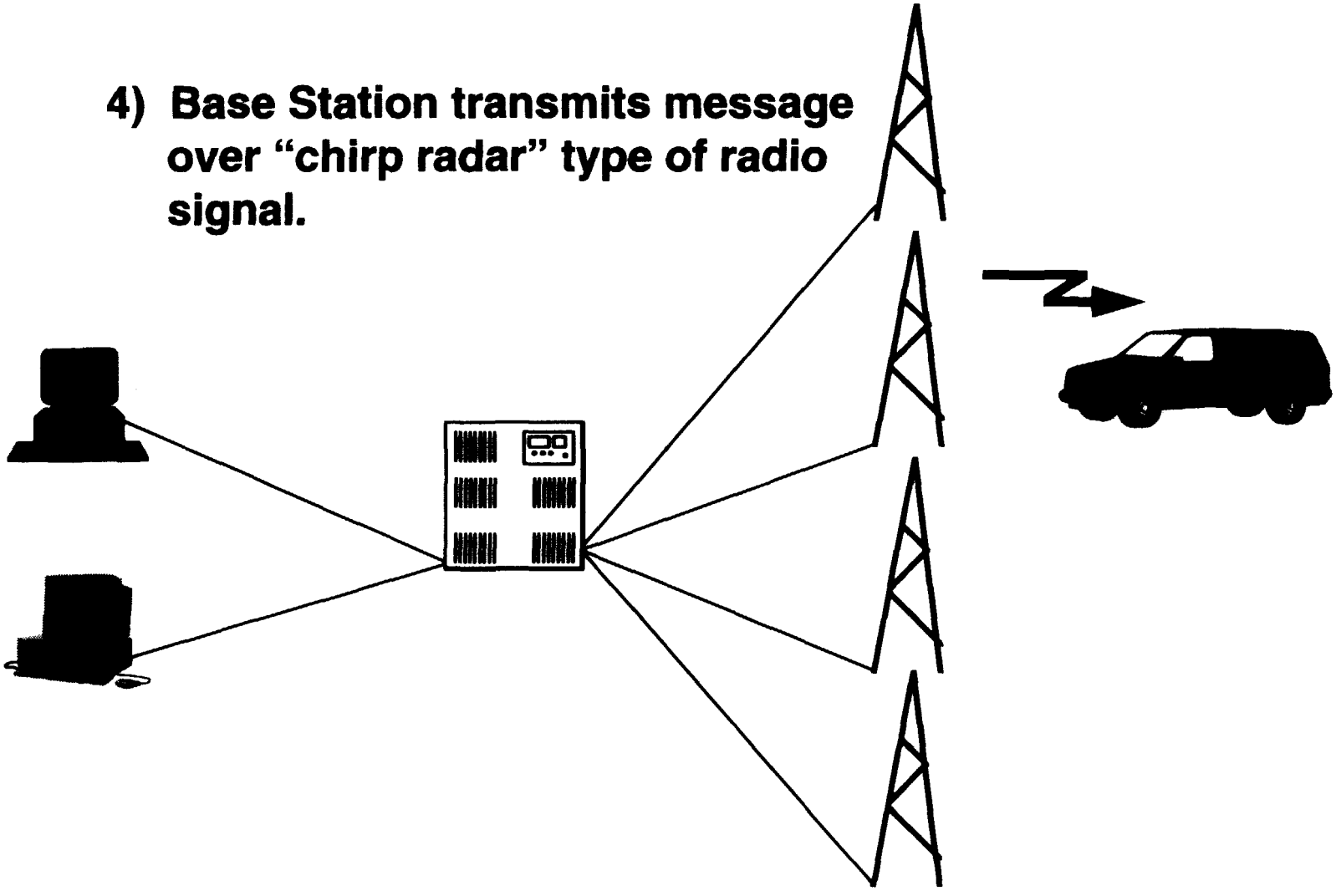


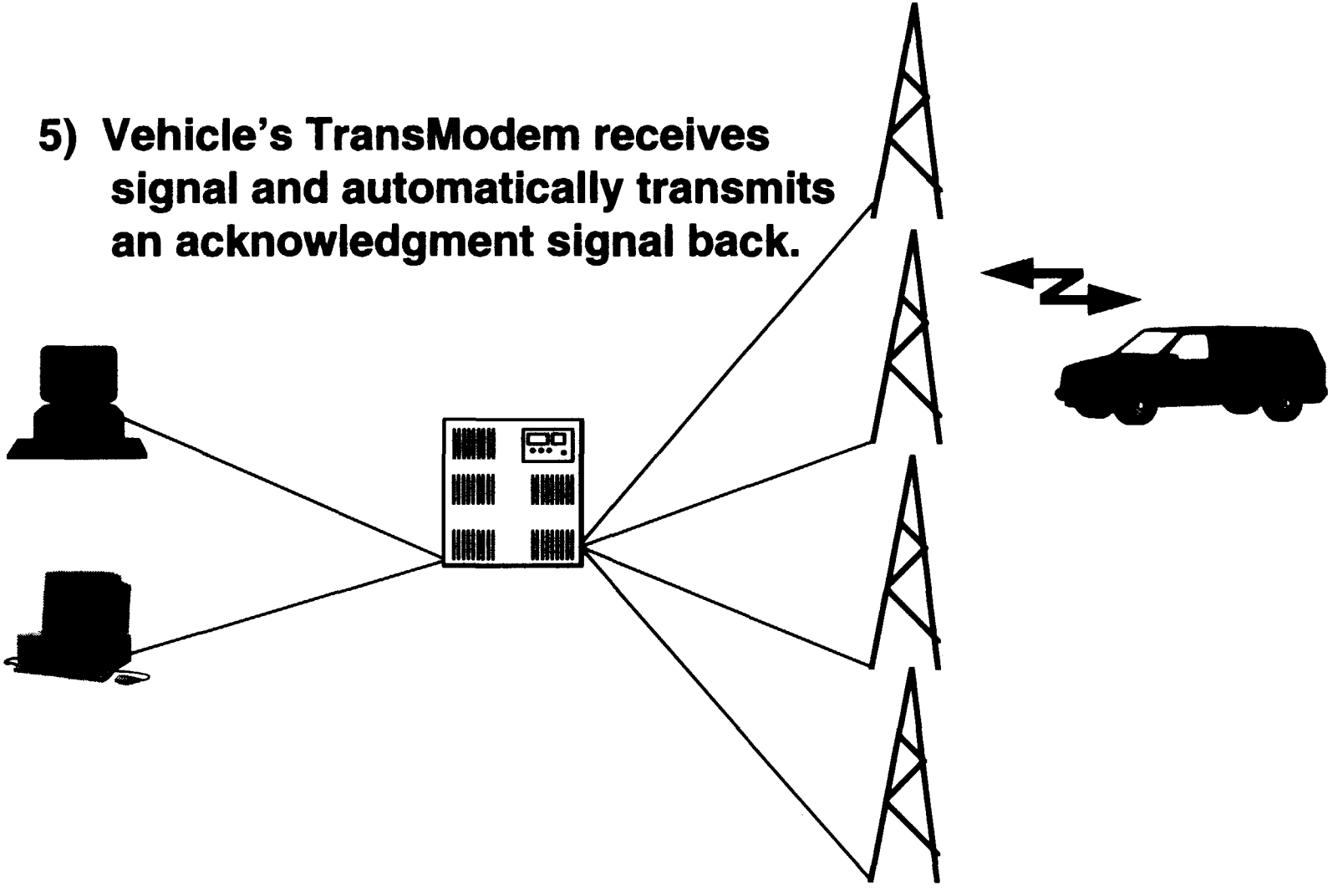
# Round Trip Message Time Averages 2 Seconds (includes .00064 seconds of Network Airtime)

4) Base Station transmits message over "chirp radar" type of radio signal.



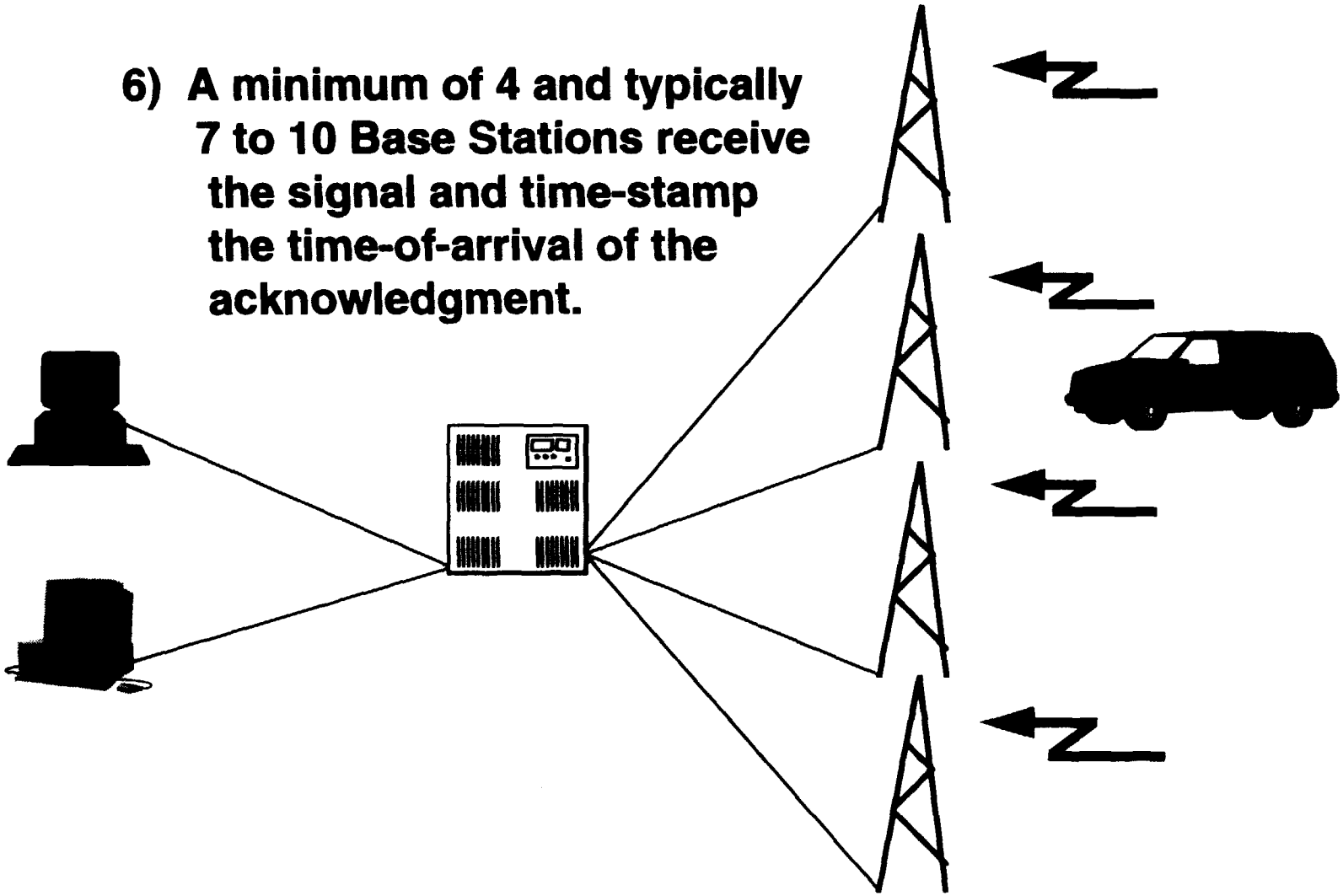
# Round Trip Message Time Averages 2 Seconds (includes .00064 seconds of Network Airtime)

5) Vehicle's TransModem receives signal and automatically transmits an acknowledgment signal back.



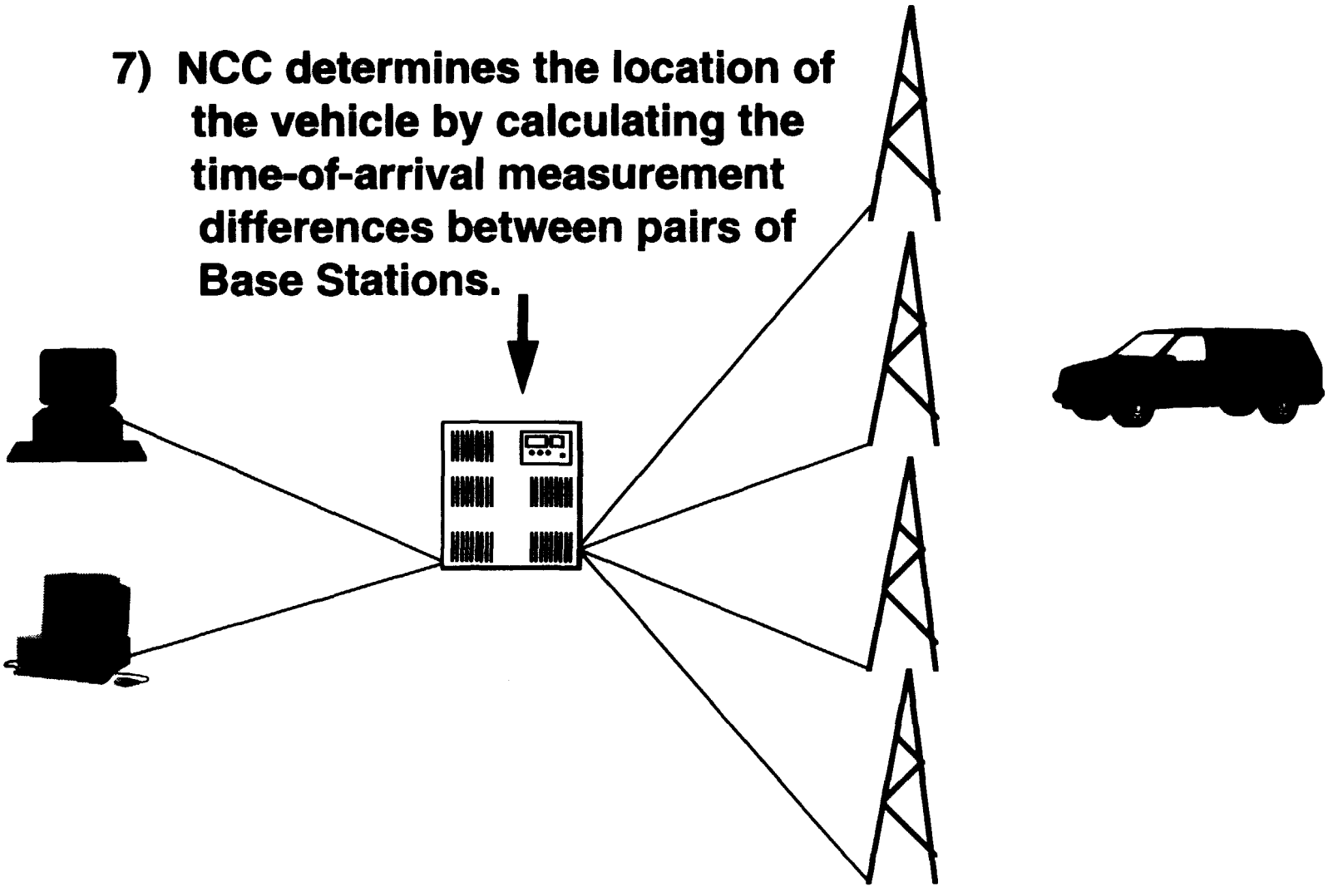
# Round Trip Message Time Averages 2 Seconds (includes .00064 seconds of Network Airtime)

6) A minimum of 4 and typically 7 to 10 Base Stations receive the signal and time-stamp the time-of-arrival of the acknowledgment.

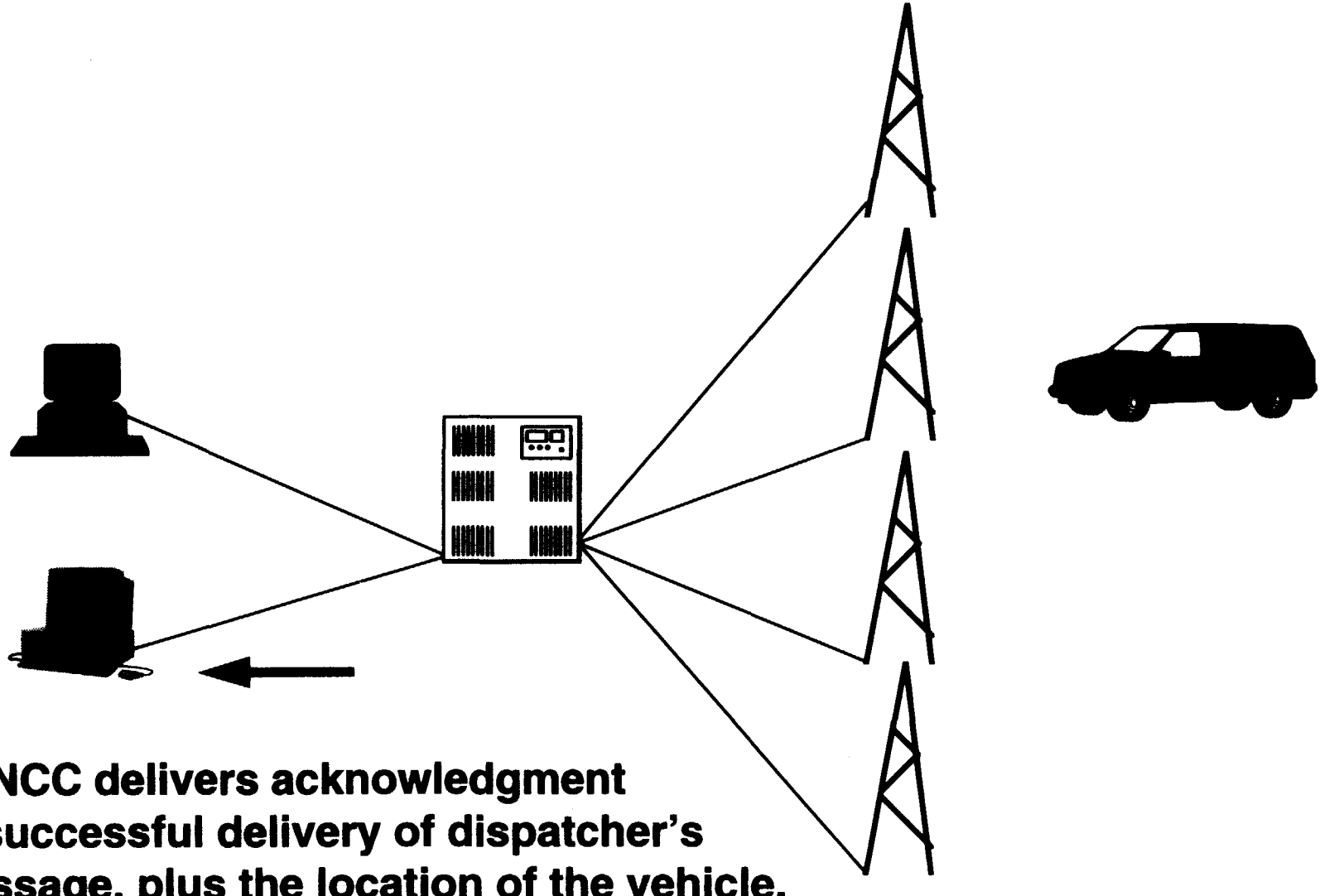


# Round Trip Message Time Averages 2 Seconds (includes .00064 seconds of Network Airtime)

7) NCC determines the location of the vehicle by calculating the time-of-arrival measurement differences between pairs of Base Stations.



# Round Trip Message Time Averages 2 Seconds (includes .00064 seconds of Network Airtime)



**8) NCC delivers acknowledgment of successful delivery of dispatcher's message, plus the location of the vehicle.**

# Round Trip Message Time Averages 2 Seconds (Includes .0006 seconds of Network Airtime)